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Financing Patterns: Measurement Concepts and Empirical Results

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FINANCING PATTERNS: MEASUREMENT CONCEPTS AND EMPIRICAL RESULTS

by

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Abstract

A widely recognized paper by Colin Mayer (1988) has led to a profound revision of academic thinking about financing patterns of corporations in different countries. Using flow-of-funds data instead of balance sheet data, Mayer and others who followed his lead found that internal financing is the dominant mode of financing in all countries, that therefore financial patterns do not differ very much between countries and that those differences which still seem to exist are not at all consistent with the common conviction that financial systems can be classified as being either bank-based or capital market-based. This leads to a puzzle insofar as it calls into question the empirical foundation of the widely held belief that there is a correspondence between the financing patterns of corporations on the one side, and the structure of the financial sector and the prevailing corporate governance system in a given country on the other side.

The present paper addresses this puzzle on a methodological and an empirical basis. It starts by demonstrating that the surprising empirical results found by Mayer et al. are due to a hidden assumption underlying their methodology. It then derives an alternative method of measuring financing patterns, which also uses flow-of-funds data, but avoids the questionable assumption. This measurement concept is then applied to patterns of corporate financing in Germany, Japan and the United States. The empirical results are very much in line with the commonly held belief prior to Mayer's influential contribution and indicate that the financial systems of the three countries do indeed differ from one another in a substantial way.

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Introduction

How is investment financed? Or, to put it another way, from where do corporations, and firms in general, obtain the funds they use for making real investments? If there are certain common features of firms in different countries with respect to this question, we speak of financing patterns. If they exist, financing patterns are an essential and characteristic element of the financial system of a country. There are several reasons why it would be interesting to know the prevailing financing patterns. A non-exhaustive list includes the following four reasons:

- Policymakers in a given country may want to understand how their national financial system functions if they wish to improve its functioning and thereby serve their national business community (Mayer, 1990; OECD, 1995).
- International policymakers need to understand how financial systems function and how firms are typically financed if they wish to assist in the introduction of a market-based financial infrastructure, as has been, and still is, a main task with respect to the transition economies of Eastern Europe and the NIS as well as many developing countries (Mayer, 1989).
- Financial economists want to be able to put microeconomic theories of finance to an empirical test using aggregate data (Corbett and Jenkinson, 1997).
- Last but not least, financial managers may want to know how others fund investments because providers of funds might be more likely to accept as reasonable what they are used. Sticking to the conventional could lower the cost of capital to a given corporation and assure its liquidity.

The capital structures of corporations in different countries have been a major research topic for many years.[1] There are substantial differences between the results obtained by the various studies which use balance sheet data; and mainly because of problems of methodology the results as a whole seem to be quite unreliable.[2] The work of Colin Mayer has led to a profound revision of academic thinking in this field, both in terms of methodology and in terms of results. Mayer and others who followed his line of research[3] use flow-of-funds data to analyze national financing patterns. Their general finding is that internal financing is by far the dominant mode of financing

[1] Rutherford (1988) surveys older studies. More recent studies include Berglöf (1991), Aggarwal (1994) and Rajan and Zingales (1995).

[2] Their main shortcomings are due to the distorting influence of different national accounting rules and conventions - a problem which is addressed with considerable acumen in Rajan and Zingales (1995) - and sampling problems, in particular a selection bias which is due to the fact that most studies use a data base inclding only large firms. However, in many countries the capital structure of large firms differs systematically from those of smaller firms.

[3] See Mayer (1988, 1990), Mayer and Alexander (1990), Bertero (1994), Edwards and Fischer (1994), Prowse (1995) and Corbett and Jenkinson (1996, 1997).

in all countries[4] and that, not least for this reason, financing patterns do not differ very much between countries. An even more interesting finding, however, is that those differences which still seem to exist are not at all consistent with the generally held belief that financial systems can be usefully classified as either bank- or capital market-dominated. This result is important not only because it challenges established views, but also because it leads to a research puzzle[5]: There does not seem to be a correspondence between the financing pattern of corporations in a given country on the one side and the prevailing corporate governance system in that country on the other side - a correspondence which the theory of incomplete contracts would lead one to expect (La Porta et al., 1997). In fact, one would expect the financing patterns to "fit" the governance systems in the sense that those to whom the governance system gives most power to influence the policies of the corporations would also be the main providers of funds, and there can hardly be a doubt that governance systems differ widely between countries. One possible explanation for this apparent inconsistency is that the empirical findings of Mayer *et al.* might not actually support the interpretations of them which are often given. The present paper argues that this is indeed the case.

In our paper we address what one could call the "Mayer puzzle" on methodological and empirical grounds. The paper is structured as follows: In the next section, empirical results of flow-of-funds studies in the spirit of Mayer (1988) are presented. We then demonstrate that the methodology used to derive these results is based on a specific assumption as to which sources of funds finance which uses of funds. It appears to us that, for answering the question "how is investment financed", this assumption is not warranted; nevertheless, it is responsible for the results.

We propose an alternative method of measuring financing patterns, which is as close as possible in its spirit to the Mayer et al. approach, but avoids the critical assumption. The new measurement concept is presented in section II and applied to Germany, the United States and Japan in section III. The *empirical* results which the alternative methodology yields turn out to be in line with expectations grounded in theory as well as with commonly held beliefs prior to Mayer's influential contribution. Section IV interprets these results and briefly shows how they fit into the context of differences between financial systems in general and corporate governance systems in particular in order to show that the "Mayer puzzle" is resolved. Section V concludes.

[4] This can be perceived as general evidence for the pecking order theory proposed by Myers and Majluf (1984).
[5] See Schmidt and Tyrell (1997). Mayer's findings are also classified as an extremely stimulating puzzle and discussed at length in Mishkin (1998), chap. 9.

I The flow-of-funds approach

A The methodology and the main results

Among the studies of financing patterns in various countries that have followed in the tradition of Mayer, the most extensive to date are those by Jenny Corbett and Tim Jenkinson (1996, 1997). They ask the seemingly simple, and evidently important, question: *"How is investment financed [in Germany, Japan, the United Kingdom and the United States]?*" To answer this question empirically, Corbett and Jenkinson use flow-of funds data for several reasons. Flow-of-funds data are more reliable than balance sheet data because they do not depend so much on accounting rules and conventions; they are more comprehensive because they cover all firms in an economy; and they are collected in ways which are largely comparable between countries. By definition, flow-of-funds data capture only flows of funds from one economic sector to another; thus, intra-sectoral flows are almost entirely consolidated and thus eliminated.

In their study, Corbett and Jenkinson employ net flows, and this in a double sense. The statistical offices report flow-of-funds data only after repayments have been netted out. For example, the figures for loan financing from banks in any given year result from subtracting all loan repayments by the nonfinancial enterprise sector from the total volume of loans from banks taken out by these very firms in the same year. Similarly, equity financing is calculated as the difference between the proceeds from issuing new shares and the expenses for redeeming outstanding shares, including the acquisition of shares in other companies, from the public. One could call this form of netting "repayment netting". The second step of netting consists in eliminating firms' financial investments. For instance, net flows between banks and non-financial companies are the difference between the volume of (net) financing of firms by banks, e.g. in the form of bank loans, and firms' financial investments with banks, e.g. in the form of bank deposits. One could call this second type of netting "balance sheet netting". The flows - thus netted twice - are then expressed as a fraction of total physical investment. Corbett and Jenkinson define the ratio of the net financing i_j from any one source j of financing - namely internal funds, banks, bonds, equity, trade credit, capital transfers, and others - to aggregate investment as the contribution of source j to the financing of total investment in a five-year period. The formula they use is $\sum_t i_{tj} p_t / \sum_t I_t q_t$, where I_t represents the total amount of gross investment in plant, machinery and other fixed assets and net additions to working capital in year t. The summation over t serves the purpose of aggregating over a certain number of periods in order to eliminate business cycle

effects and other peculiarities of any given year. p_t and q_t are appropriately chosen price indices. Table I shows the Corbett and Jenkinson results.

Table I: Net sources of finance in four countries 1970-1994

Net Source of Finance	*Germany*	*Japan*	*Great Britain*	*United States*
	In percent of physical investment (1970-1994)			
Internal	78.9	69.9	93.3	96.1
Bank finance	11.9	26.7	14.6	11.1
Bonds	-1.0	4.0	4.2	15.4
New Equity	0.1	3.5	-4.6	-7.6
Trade Credit	-1.2	-5.0	-0.9	-2.4
Capital Transfers	8.7	-	1.7	-
Other	1.4	1.0	0.0	-4.4
Statistical adjustment	1.2	0.0	-8.4	-8.3

Source: Corbett and Jenkinson (1997)

These results do not differ in any important respect from those derived and published almost a decade earlier by Mayer, which have by now been accepted by many authors as a very important insight into the real financing patterns of firms.[6] As Mayer did at that time, Corbett and Jenkinson discuss the overwhelming importance of internal finance in all countries covered in their study, and also the finding that, compared with Germany, whose financial system is allegedly dominated by banks, bank financing in fact appears to be more important in the UK and almost equally important in the United States, even though the UK and the U.S. are commonly considered to have capital-market dominated financial systems; and they discuss the seemingly paradoxical result that equity financing is negligible everywhere and even negative in both the UK and the U.S. They summarize their findings by concluding that

"[t]he celebrated distinction between the market based financial pattern of the United Kingdom and the United States and the bank-based pattern of Germany is inaccurate." (p. 85)

[6] The phenomenon discussed in depth by Mayer et al. seems to be common knowledge by now. It is described in almost every recent corporate finance textbook, without, however, quoting Mayer in all cases. For instance, Brealey and Myers present extensive tables with net sources of financing on pp. 364-367 of the 5th edition of their well-known textbook. With reference to the U.S., they write on p. 367: "*The most striking aspect* [of these tables] *is the dominance of internally generated cash, defined as cash flow from operations less cash dividends paid to stockholders. Internally generated cash normally covers a majority of firm's capital requirements*." Page 324 of their 4th edition contains the additional comment: "*Notice that the reliance on internally generated cash is the same the whole world over*." Similar textbook presentations of net sources of financing include Arnold (1998), p. 351, and Pike and Neale (1996), p. 465 (both with special reference to the United Kingdom), Buckley et al. (1998) p. 354, Damodaran.(1997), p. 404 (with special reference to the G6-countries). Explicit references to Mayer in the research literature include Allen (1993), Allen and Gale (2000), Conti (1992), Dewatripont and Tirole (1994), Hellwig (1991, 1997), and Thakor (1996).

Given that the "celebrated distinction" has a lot of theoretical as well as empirical arguments to corroborate it - one of them being supported by data on levels (or stocks) of financing derived from the same very same database the MCJ flow-studies rely on (see Table II) - this is indeed a puzzle which needs to be solved. If one wished to reconcile the findings of Mayer and Corbett/Jenkinson (henceforth MCJ) with what others have postulated or would still feel inclined to believe, one should investigate whether their measurement method is appropriate; and this is what we wish to do now. So the natural question arises: which factors determine the MCJ results?

Table II: Composition of non-financial companies' inter-sectoral liabilities in four countries[7]

Balance Sheet Items	*Germany*	*Japan*	*Great Britain*	*United States*
	% of total inter-sectoral liabilities at market prices (1971-1996)			
Bank Loans	49,5	56,8	14,3	15,3
Securities (including equity)	18,8	42,5	65,2	72,2
Others	31,7	0,7	20,5	12,5

Source: National Account statistics and own calculations

B How can the Mayer et al. results be explained?

In order to identify what we consider to be the main factor behind the MCJ results, we present a simple model of a stylized economy. There are three firms (or industries) *A*, *B*, and *C* in the economy which undertake investments in real assets. In each period, only one of the three firms invests. Every investment is financed in the same way, namely 30% with internal funds and 70% with bank loans. We believe that it conforms to a common understanding of a financing pattern to say that this 30 to 70 relationship is "the financing pattern" of investment in this economy, and that the 30 to 70 percent relationship also provides the answer to the question quoted above, with which Corbett and Jenkinson start their paper. The economy runs over 9 periods, $t = -3$ to 5. Physical investment is 50 in the first three periods, then goes up to 95 and subsequently declines and rises again, as is shown by the dotted line in Figure 1 and by the first row in Table III. Thus, there are business cycles in this economy. The second row in Table III and the bars above the horizontal axis in Figure 1 - which are 35 for the first three periods - and the second row in Table III show the amount of external financing by banks to the one firm that is investing in the

[7] Level data are characterized by one major disadvantage relative to flow data. The figures for securitized items are in most cases reported at market prices, so that they are not only influenced by the assumption and the redemption of obligations in the past periods but also by price changes which are not connected to the ways in which investment is financed. However, like aggregated balance sheet data they still provide us with a crude impression of the roles various instruments play in the financing of companies in different countries.

respective period (distinguished by different shadings). These financing figures are gross financing flows in the sense of *not* having been subjected to "repayment netting".

Figure 1: Model economy with three firms

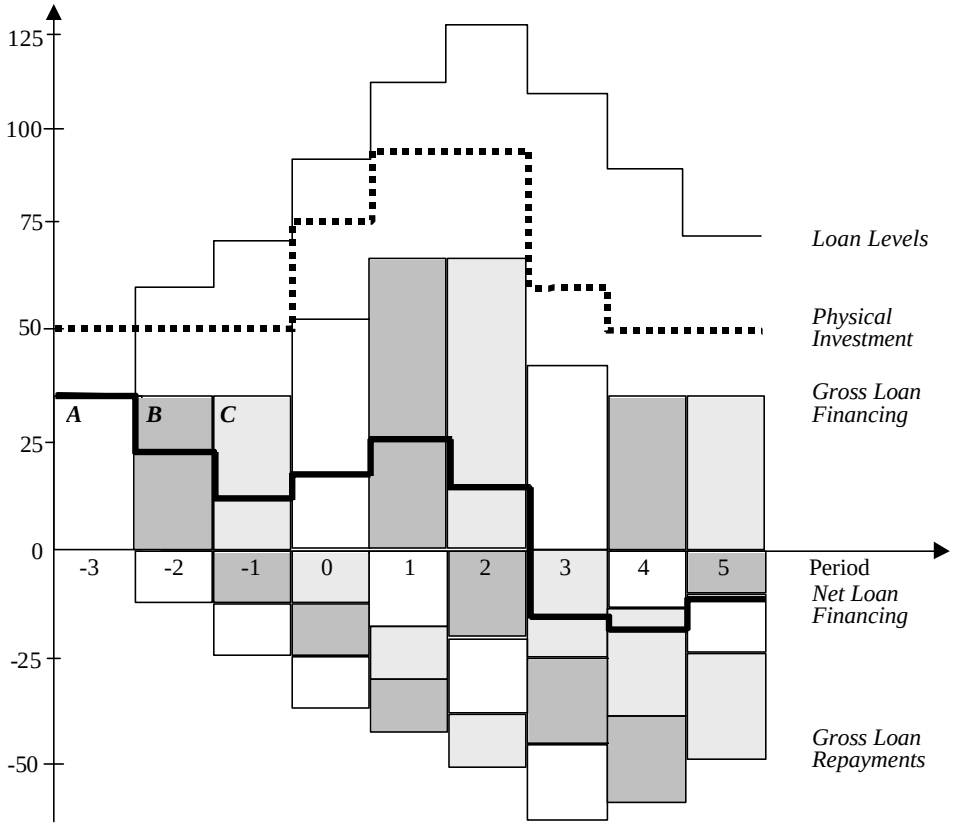

Table III: Financing patterns in the model economy

Period	***-3***	***-2***	***-1***	***0***	***1***	***2***	***3***	***4***	***5***	***0 to 5***
1. Physical Investment	50	50	50	75	95	90	70	50	60	440
2. Gross Loan Financing*	35	35	35	53	67	63	49	35	42	308
3. Gross Loan Repayments**	0	12	23	35	41	51	61	60	49	296
4. Net Loan Financing	35	23	12	18	26	12	-12	-25	-7	12
5. Loan Levels	35	58	70	88	113	125	113	89	82	
6. Internal Funds***	15	27	38	58	69	78	82	75	67	428
				Periods 0 to 2			***Periods 3 to 5***			
7. Net Loan Financing/Physical Investment				21%			-24%			3%
8. Internal Funds/Physical Investment				79%			124%			97%

* 70% of physical investment ** maturity of three years, constant repayment amounts

*** must by definition equal 30% of physical investment plus loan repayments

But loans have to be repaid. For our model economy, we assume that they are repaid in equal installments in *M* periods after they have been taken out. Let *M* be 3. Figure 1 shows the (gross) repayment flows as bars below the horizontal axis - again with different shadings for the three firms (also see row 3 in Table III). For instance, in period -1, a third of the loan taken out by firm *A* in period -3 and a third of the loan of firm *B* from period -2 are repaid. Total gross repayment is (rounded to) 23. As firm *C* invests and borrows in period -1, the *net* external or bank financing in that period is only 12. This is shown by the bold line (and row 4. in Table III). In the following periods investment and thus also financing go up, while the smaller loans from earlier periods are repaid. Therefore net financing goes up and later on declines when investment declines cyclically. In the "recession periods" 3 to 5 net financing even becomes negative - and all this in spite of the fact that, consistently, 70% of all investments are financed externally by banks.

The simple model captures the essence of what MCJ use as the measure of "*the relative significance of different sources of finance in physical investment*" (Mayer and Alexander (1990), p. 454). The essential point in the MCJ measurement concept is that the financing from each of the individual sources of funds *j* is on a net basis in the sense of "repayment netting" explained above and as illustrated with our model.[8] In the last two rows of Table III the MCJ concept and their formula are applied to two three-year intervals and to the entire period covering $t = 0$ to $t = 5$ in our example. As one would already expect from comparing the dotted line and the bold line, internal financing dominates clearly even in the phase of expansion. For the entire period bank financing seems to be completely irrelevant, although it has been consistently assumed that banks finance 70 percent of all investments. Thus, it seems fair to say that this method of determining "*how investment is financed"* leads to a distorted picture of the reality which it aspires to capture, and that it might even suggest far-reaching, but misleading implications. Imagine that, based on the results for the model economy, someone would conclude that there was no reason to have banks at all! This does, however, not imply that there would not be important questions to which the MCJ measurement based on (double) netting does present important insights. It does indeed show the relative *net* contributions of different sources of finance over a given time interval.

The factor which produce the MCJ results is the implicit assumption concerning how funds from each particular source are used: It is assumed that funds from bank loans are used in the first instance to pay back bank loans, while proceeds from the issue of new bonds or shares are first of

[8] Note that there is no room for "balance sheet netting" in our model economy as firms do not deposit any funds with banks.

all used to redeem or buy back bonds and shares, respectively - and this on a sector-wide level. Only what remains after these "primary" uses of funds is assumed to finance investment. The case of internal financing is the only one in which there is no corresponding "use of first resort", and this creates the impression that investment is almost exclusively financed internally.[9] Only if this allocation of sources to uses of funds is avoided can one arrive at a realistic picture of how investment is financed: All sources of funds are jointly employed for all uses of funds, and thus all sources of funds jointly provide the funding of investment. This is why it may be misleading to look at net financing instead of gross financing, and even more so to derive implications concerning the various financial systems from the measurement results, and why it may be worthwhile to try out a method of measuring the financing of investment on the basis of gross financial flows, which we want to do in the next section.

II A new approach to the measurement of financing patterns

A The general idea - gross flows

This section develops a new approach to measuring financing patterns. The aim is to arrive at a reliable picture of how the investments of firms are financed. As the example presented in the preceding section shows, the gross flows, the bank-financed part of which are indicated by the bars above the horizontal axis in Figure 1 and line 2 of Table III, provide the correct answer to the question of how investment is financed. However, the official flow-of-funds data only provide two sets of data, namely stocks of claims (or loan levels shown in line 5 of Table III) and net flows-of-funds per period (corresponding to line 4), between sectors. The problem is, therefore, to find a way to reconstruct gross flows. The general idea behind the method of reconstruction proposed here is that - in the case of debt instruments - the gross flows are given by the sum of the net flows of any given period plus the repayments in that period for debt taken out in earlier periods.

B The conversion from net to gross flows

In reality financial contracts differ with respect to their terms to maturity and their repayment patterns. In order to reconstruct gross flows, we need to make two simplifying assumptions. One is that financial instruments *of any given type* have a "standard" maturity, which is the estimated average maturity for instruments of that type in a given economy; the other is that repayment is

[9] It is interesting to note that Jensen's (1986) theory of free cash flow also postulates a specific use of internally generated funds for specific sources. But Jensen's explicit assignment of funds is exactly the opposite of that implicitly assumed by the double netting procedure employed by net flow-of-funds studies.

always in equal installments. Both assumptions are because of the unavailability of precise data, i.e. information on the attributes of every single loan taken out by any company in each of the three countries covered in our empirical study.

Consider a class of loans with a term to maturity of M years. Denote the *c*ash *i*nflow from taking out new loans in period t by $CI(t)$, the *c*ash *o*utflow for repaying old loans in period t by $CO(t)$ and the resulting *n*et *c*ash flow by $CN(t)$. By definition, $CI(t)$ - which is the figure we are seeking - is given by the following equation:

(1) $CI(t) = CN(t) + CO(t)$

By construction, that is by applying the two simplifying assumptions from above,

(2) $CO(t) = CI(t\text{-}1)/M + CI(t\text{-}2)/M + \ldots + CI(t\text{-}M)/M$

must also hold. Now let $S(t)$ denote the accumulated *s*tock of loans of type j at the end of period t. A third assumption then allows us to reconstruct $CI(t^*)$ from $S(t^*)$ and $CN(t^*)$ for a chosen base year t^*: We assume that the (gross) volumes of new loans CI* taken out in the M periods $t^*\text{-}1$, $t^*\text{-}2$, ... , $t^*\text{-}M$ prior to the base year t^* are identical: $CI(t^*\text{-}1) = CI(t^*\text{-}2) = \ldots = CI(t^*\text{-}M)$. It follows from our assumptions that $CI^* = CO(t^*)$; the loan repayment in the base period equals the standard size of the gross loans of the M preceding periods. But as neither CI^* nor $CO(t^*)$ are observable or provided by the data base, it is important that their value can be deduced from the observable values of the stock $S(t^*)$ and the net flow $CN(t^*)$ in the base period. As can be easily verified, CI^* must then be given by

(3) $CI^* = 2[S(t^*)\text{-}CN(t^*)]/(M+1)$.

Inserting CI^*, and thus also $CO(t^*)$, from equation (3) into equation (2), we can then use equation (1) to compute $CI(t^*)$. Now that $CI(t^*)$ is known, equation (2) can be solved for $CO(t^*+1)$, which in turn will yield $CI(t^*+1)$ through equation (1). As becomes obvious, all the cash inflows for the subsequent years can be computed by "rolling forward" equations (1) and (2). In summary, all that we need in order to reconstruct gross flows for debt instruments is an estimate of the average maturity M of all instruments that fall into a given class j and assumptions concerning the typical repayment schedule.

In Table IV we have applied the concept to the model economy from the previous section assuming that the only data at hand are figures for bank loan levels and bank loan net financing for the years t^* to t^*+5. We chose t^* as the base year and then applied equations (3), (2) and (1) from above consecutively to arrive at an estimate for the amount of gross bank financing in t^*: Based on

the assumption that bank financing has been constant during the three periods prior to the base year and that the average maturity of loans taken out was three years, CI^* must equal 35 in order to yield an amount of loans outstanding of 88 units in t^*.

Table IV: Reconstruction of gross flows based on level and net flow figures (M=3)

Period	*t*-3*	*t*-2*	*t*-1*	*t**	*t*+1*	*t*+2*	*t*+3*	*t*+4*	*t*+5*	*t* to t*+5*
Physical Investment				75	95	90	70	50	60	440
Loan Levels $S(t)$				88	113	125	113	89	82	
Net Loan Financing $CN(t)$				18	26	12	-12	-25	-7	
Gross Loan Financing $CI(t)$	35	35	35	53	67	63	49	35	42	308
Gross Loan Repayments $CO(t)$				35	41	51	61	60	49	
				Periods t* to t*+2			***Periods t*+3 to t*+5***			
Net Loan Financing/Physical Investment					70%			70%		70%

Equation (3), *CI**, *Equation (1)*, *Equation (2)*

Equation (2) leads to $CO(t^*)=CI^*$ and given a net flow of loans of 18 units the sought after figure for $CI(t^*)$ must equal 53 units. Reapplying equation (2) to the loans taken out in periods t^*-2 to t^* we arrived at $CO(t^*+1)=41$ and adding $CN(t^*+1)$ as set down in equation (1) we obtained $CI(t^*+1)$. The last two steps were then sequentially reapplied for all subsequent periods until t^*+5. As can be easily verified by comparing Tables IV and III, the reconstructed gross flows are identical with the actual gross flows from the example. Consequently, the ratio of reconstructed gross flows to physical investments amounts to 70% and thereby indicates what we consider to be the true significance of bank finance in the model economy.

C The reconstruction of gross flows: An example

Whether the information necessary for estimating $CI_j(t^*)$ from the outstanding stock $S_j(t^*)$, the net flow $CN_j(t^*)$, and the term to maturity M_j is available, or can at least be estimated with a sufficient degree of accuracy, is an empirical question. As can be seen from equation (3), estimation errors with respect to the unknown parameter M matter less the greater the lower bound for the estimate. The lower bound itself can be derived from official statistics.

Take the case of long-term bank loan financing of German firms. In its monthly reports, the Deutsche Bundesbank reports how the total volume of bank loans to businesses outstanding at the end of a given year divides up into loans with an original maturity of between one and four years, and into those with an original maturity of more than four years. During the years between 1990

and 1996, only 14% fell into the first category, whereas the majority fell into the second category.[10] Even when allowing for extreme distributions of maturities within the two categories it seems safe to conclude that four years marks the lower bound for any estimate of M_j; with *j* denoting "long-term bank loans to German enterprises". If we assume the maturities to be more uniformly distributed, an estimated average value for M_j of six years seems more appropriate.

Applying this estimate to the German data on long-term bank loans leads to the empirical result presented in Table IV and Appendix 1, namely that 73% (1970-1996) of gross investment has been "financed with" long-term bank loans.[11] This should not be misinterpreted as saying that these long term loans were "really" used to pay for capital goods etc., as of course this would also imply an inappropriate attribution or allocation of one source of funds to one specific use of funds. The long-term loans were used to contribute, together with all other sources of medium to long-term funds, to the totality of all medium to long-term uses of funds.

Generalizing the method explained for the case of long-term bank financing in Germany, one can collect data for the terms to maturity and the amounts of stocks and net flows for various classes of financial instruments for different countries and estimate the gross flows by applying the procedure described above and summarized in equations (1) to (3).

III Measuring financial patterns in three large economies

A Data and assumptions

The data sources which have been used for measuring the gross flows as indicators of financial patterns in Germany, Japan and the United States are the official statistics of the respective authorities.[12] Gross figures on equity financing are taken from various stock exchange publications. The following two important assumptions were made. First, we followed the practice of MCJ in assuming that *short-term* financing is indeed used for *short-term* investment only. In this special case their assumption seems to be more appropriate than it is as a general assumption; in addition, including short-term financial instruments would make interpretation in terms of the

[10] Interestingly, the distribution of loans between the two classes has not varied strongly over time: The portions for loans in the second category in the four 5-year periods between 1970 and 1989 have been 78%, 84%, 84%, and 87%, respectively.

[11] A simple sensitivity analysis applied to the estimate of the maturities yields the following result. If we assume the average maturity of German bank loans to be 4 (8) years instead of 6, the empirical estimate of .73 reported in the last column of Table VI below would have to be replaced by .93 (.65), which would leave the qualitative result unaffected.

[12] In the case of Germany, they are from the *Gesamtwirtschaftliche Finanzierungsrechnung* of the Deutsche Bundesbank, in the case of Japan they have been obtained from the Japanese National Accounts compiled by the Bank of Japan, and for the U.S. the data are from the Federal Reserve System's Flow of Funds Accounts.

gross flows extremely difficult because the short-term flows would appear to have an inappropriately large influence on total financing.[13] Thus we restricted the following calculations to financing instruments for which the time to maturity is at least one year, and called this long-term financing for the sake of brevity. The second important assumption is that all fixed income financial instruments are repaid in equal installments over their estimated maturities. The first columns in Appendices 1-3 show our estimates (in years to maturity) for the various instruments considered in the three countries. Columns 3 and 5 list average figures (1970-1996) for all gross financial flows, i.e. sources and uses of funds, including short-term instruments.[14]

B Empirical results

One of the most prominent results of the studies by Mayer and Corbett and Jenkinson is that internal financing is by far the most important source of financing in all countries which these authors analyzed. Only in Japan is the share of internal financing less pronounced, which Sussman (1994) explains by observing that due to the phenomenal growth of the Japanese economy during the past two decades, internal funds may simply not have been sufficient to finance all investments which have been undertaken.

The upper panel of Table V shows the results concerning the importance of external financing in the three countries for the time span between 1970 and 1996 (the respective figures for internal funds are shown in Table VI below, together with the gross contribution of individual sources of external funds). By applying equations (1) to (3) and choosing 1960 as the base year t^* for all three countries we estimated the values of *all* sources of inter-sectoral long-term financing, added them up and expressed them as a percentage of total physical investment. By construction, and therefore in contrast to Corbett and Jenkinson, these figures are gross figures and thus exceed 100%. The numbers in the lower panel were derived similarly, except that only those gross flows entered the nominator that involved securitized instruments like bonds and stocks.

[13] Setting M_j=1 in our method is equivalent to the assumption that the total volume $S_j(t\text{-}1)$ outstanding at the end of period t-1 has been fully repaid in t and that all of $S_j(t)$ has been a cash inflow during the same period. Even if the resulting gross figures were good estimates for the true flows, they do not help us very much in answering the initial question "*How is (long-term) investment financed?*" but rather characterize the liquidity management of the enterprise sectors analyzed. For the sake of completeness, we have included the reconstructed gross flows relating to short-term instruments in appendices 1 to 3.

[14] More detailed information on the data base is contained in xxx (references will be supplemented later in order not to identify the authors of the present paper).

Table V: The importance of external funds and securities

External Funds	*70-74*	*75-79*	*80-84*	*85-89*	*90-96*	*70-96*
			new long-term external funds / physical investment (in %)			
Germany	81	93	95	97	95	93
USA	137	137	141	182	189	163
Japan	114	169	169	189	203	176
Securitized Funds						
			new long-term securities issued / physical investment (in %)			
Germany	12	9	8	11	13	12
USA	42	42	41	45	48	45
Japan	10	10	10	15	16	13

Disregarding all details, Table V provides a completely different picture from that of the Corbett and Jenkinson study reproduced in Table I. Most important, we arrive at different indicators for the relative importance of external and internal funding: There are indeed significant differences between the three financial systems which the new measurement method brings out clearly. The latter point is underscored by the results in the lower panel. With a surprising consistency over time, the share of securities, or capital markets, as a source of financing is obviously very different between the three countries. It is completely in line with generally held expectations that capital markets are a much more important source of financing in the U.S. than in Germany and Japan. Even though securitized financing is not necessarily financing by providers of funds other than financial intermediaries and in particular other than banks[15], this result supports the view that the three financial systems differ greatly and in a predictable way.

Table VI offers a closer look at the composition or patterns of external financing for the three countries in a way which is directly comparable to the Corbett and Jenkinson results, i.e. as a percentage of physical investment. Apart from minor details the first line concerning internal finance corresponds to their figures. Table VII offers a complementary view on the very same financing patterns by a slight alteration of the observation angle. It presents the composition of gross external financing according to the sectors which provide funds to the sector of non-financial companies and thus replaces the instrumental perspective from above by an institutional perspective. In keeping with the standard sector classification of flow-of-funds statistics, five

[15] For a recent discussion of this point, see Schmidt, Hackethal and Tyrell (1999).

sectors are distinguished, with the rest of the world (RoW) and government lumped together.[16]

Table VI: Patterns of external gross financing by instrument

Instruments	*70-74*	*75-79*	*80-84*	*85-89*	*90-96*	*70-96*
			***USA** (% of physical investment)*			
Internal finance	71	82	83	93	103	89
Bank loans	64	61	64	75	62	65
NBFI loans	15	19	19	26	36	25
Bonds	39	38	37	55	62	49
Commercial paper	4	4	7	11	15	9
New equity	n.a.	n.a.	n.a.	n.a.	n.a.	15*
			***Germany** (% of physical investment)*			
Internal finance	77	96	94	98	83	88
Bank loans	62	74	76	76	75	73
Loans from insurance companies	10	11	10	10	8	9
Bonds	7	5	5	7	8	7
New equity	3	3	3	4	5	3
			***Japan** (% of physical investment)*			
Internal finance	50	72	71	76	75	70
Bank loans	102	152	152	161	172	152
from public financial institutions	9	16	16	20	29	20
Bonds	8	14	12	12	20	14
Commercial paper	0	0	0	9	11	6
New equity	4	4	4	7	2	4

* The available data permitted us to report a figure for the average cash inflow through equity issues for the period 1988-1995 only. For the same reason, no figures for the equity financing of the non-corporate businesses can be shown. Crude estimates on the basis of levels outstanding range from around 20% in the early 1970s to approximately 10% in the mid-1990s.

The Banks and the non-bank financial intermediaries (NBFI) are distinguished as two sub-sectors of the financial sector in order to point out interesting differences and developments. Note that in this table, the figures are percentages of total external long-term funding and thus add up to 100. Presenting the sectoral breakdown as percentages of total investment, as in the tables above, would not alter the conclusions, but make them less obvious. As one can easily see from Tables V to VII, the patterns of external financing differ very much between the U.S. on the one side and Germany and Japan on the other. In the case of bank finance, the difference is most pronounced. Bank loans have been the dominant source of external finance for both German and Japanese

[16] Whereas in the case of the instrument "bank loans" it is clear to which sector the creditor belongs, in the case of some other instruments, notably shares, bonds, and commercial paper, the National Accounts do not name the claim-holders' sector explicitly. Thus, for deriving Table VII, we had to make another simplifying assumption, namely that investors map the market in their portfolios. Let households hold shares worth 200 units in a given year and let total market capitalization be split in 60% issued by non-financial companies, 30% issued by banks, and 10% issued by NBFI. We assume that households hold non-financial companies shares worth 120, bank shares worth 60 and NBFI-shares worth 20 units and thus follow the proposition of the standard CAPM.

companies, whereas they only made up for about a third of American companies' external financing needs in the early 1990s.

Table VII: Composition of external gross financing by sector

Sectors	*70-74*	*75-79*	*80-84*	*85-89*	*90-96*	*70-96*
			***USA** (% of total long-term external finance)*			
Banks	51	49	49	46	36	44
NBFI	36	39	40	41	49	42
Households	12	11	7	7	9	9
RoW/Government	1	2	4	6	6	4
			***Germany** (% of total long-term external finance)*			
Banks	80	82	84	82	83	82
NBFI	14	14	12	13	11	12
Households	4	3	3	4	4	4
RoW/Government	2	1	1	2	3	2
			***Japan** (% of total long-term external finance)*			
Banks	95	95	95	91	92	93
of which: public financial institutions	8	10	10	12	17	13
NBFI	2	2	3	6	6	5
Households	2	2	2	2	1	2
RoW/Government	1	0	1	0	1	1

Assuming, as one can do with only some slight reservations, that NBFI financing mainly takes the form of buying and holding instruments with active secondary markets, one also recognizes a marked difference between the relative weights of capital market financing via NBFIs not only between the three countries, but in the case of the United States also over time. In the U.S. the most important group of NBFIs are pension funds and mutual funds which mainly invest in securities. Thus capital markets- or NBFI-financing appears to have changed places with bank financing in the course of the last 25 years. During the same period, NBFI-financing in Germany and Japan consisting primarily of funds from insurance companies which do *not* invest in securities to a great extent, has only moderately increased in Japan and has even slightly decreased in Germany. Contrary to MCJ's double-netting approach, our gross approach thus yields results that indicate country-specific trends in financing patterns: Whereas American companies clearly emancipate themselves from bank financing and thus from the reliance on one particular sector, both German and Japanese companies seem to remain heavily dependent on their banking sectors. Hence, we can observe a profound or structural divergence of national financing patterns. This completes our presentation of results.

IV Financial systems *do* differ

The comparisons of stocks of inter-sectoral financial claims and of gross flows of funds between sectors show that the financing patterns in the three large economies discussed in this paper differ substantially. This suggests that it makes sense to speak of different national financing patterns. The "*celebrated distinction between the market-based financial patterns of ... the United States and of the bank-based patterns of Germany*" is *not* inaccurate, as Corbett and Jenkinson seem to believe on the basis of their measurement procedure. To conclude the paper, we briefly analyze whether this result can be generalized in such a way that it also makes sense to speak of types of national financial systems and to distinguish between financial systems of specific countries accordingly. Our answer will be sketched out in two steps.

One would expect the financing patterns in a given country to be a reflection of the corporate governance system of that country. National corporate governance systems differ considerably. Anglo-Saxon countries, in particular the United States, have corporate governance systems in which the market for corporate control used to play a key role at least in the recent past. Their main corporate governance problem is seen as being that of making managers act in the interests of shareholders. Maximizing shareholder value is not merely the paramount objective of corporations, it is also the only legitimate objective. Thus, capital markets are very important for corporate governance. The relationship between Anglo-Saxon banks as lenders and firms as borrowers is typically at arm's length, and banks are not even allowed to play an active role in the governance of the corporations to which they lend. Finally, in Anglo-Saxon corporations there is no place for anything which would resemble codetermination. Like those of shareholders and lenders, the interests of employees are typically secured by giving them outside - or exit - opportunities rather than by creating internal structures through which their voices can be heard. To use the term coined by Franks and Mayer (1995), the entire systems are "outsider-controlled".

Although they differ from one another in several important respects, both the German and the Japanese corporate governance systems are based on principles that are diametrically opposed to those of the Anglo-Saxon outsider-controlled systems. Active takeover markets hardly exist. It is more than questionable that management's main task - let alone its only task - should be to maximize the share price. Not only do most managers see themselves as having a commitment to serve the interests of several groups of stakeholders, but the legal system also obliges them to do

so.[17] Thus the capital market has a limited role to play in disciplining and guiding management. Banks as lenders are closer to their borrower-clients, and they are also heavily involved in the internal mechanisms of corporate governance - when things are going well for the respective firm and even more so when it gets into trouble. Both systems feature mechanisms whereby persons who represent the interests of employees - or of certain core groups of employees - are able to directly influence the governance of corporations, be it in the framework of legally mandatory codetermination as in Germany, or merely as a result of established practice and implicit labor contracts as in Japan. All in all, the two corporate governance systems are, to use the terminology of Franks and Mayer (1995), "insider-controlled".

It would be more than strange if there were widely different corporate governance systems on the one side and basically identical financing patterns on the other. The new method of measuring financial patterns presented and applied in this paper leads to empirical results which are in line with what one would expect on the basis of the respective corporate governance systems: Capital markets and banks are either important or unimportant, respectively, as a source of funding *and at the same time* as an element of corporate governance. Thus the puzzle presented by the findings of Mayer and those who followed his line of research seems to be solved.

We now come to the second step.[18] A financial system consists of at least four elements or subsystems. Two of these, namely financing patterns and corporate governance systems, have already been discussed. Evidently, another element or subsystem of the financial system of a country is its financial sector, which is itself composed of financial markets and institutions and exhibits certain structural features. The fourth element or subsystem is the predominant business system, which is characterized by corporate structures and strategies and thus also by the prevailing methods and processes of making adjustments to changing circumstances in the environment in which firms operate.

As the colloquial use of the term "system" suggests, a system is more than a collection of elements. It is composed of *complementary* elements. Elements are complementary if they mutually increase the "benefits" they yield in terms of whatever the objective function or the standard for evaluating the system may be, and mutually reduce their disadvantages or "costs". A

[17] Interesting empirical evidence on the importance which managers in different countries attach to various constituencies is reported in the first chapter of Allen and Gale (2000). For an economic and legal analysis of the shareholder-value rule in the case of Germany, see xxx (see note 14) .

[18] The following argument is based on the work of Milgrom and Roberts (1995) and transfers their concept of business systems to financial systems.

system is *coherent* if its complementary elements take on values which make the system attain a local optimum, i.e. if the elements or subsystems "fit together". Systems of complementary elements typically have more than one optimum, and the local optima are clearly distinct configurations of the values of the elements.

Financial systems can be regarded as systems in this specific sense.[19] The complementarity of their core elements or subsystems and the economic benefits which a coherent financial system can be assumed to produce are the factors which account for the tendency of the financial systems of successful economies to be also consistent. Coherent financial systems are of two types: One type is characterized by a financial sector in which banks are the dominant element of the financial sector, firms are to a large extent financed by banks, corporate governance is "insider controlled", and the prevailing business system is one with much firm-specific human capital, many implicit contracts and a tendency towards gradual change. The other type is characterized by the opposing set of values for the four elements or subsystems: capital markets are a more important element of the financial sector than banks, there is less bank financing of firms, corporate governance is "outsider-controlled", and corporations are highly flexible, being able to undertake strategic adjustments with "big leaps".[20]

If one could establish that the actual financial systems of specific countries were indeed coherent systems, this would have far-reaching implications. It would suggest how the financial and the non-financial sectors of different countries interact and it would help to answer the important question whether financial systems tend to converge or not.[21]

The financial systems of the United States and Great Britain and of Germany and Japan largely conform to the theoretical distinction between the two types of financial systems. At least the composition and structures of the financial sectors, the corporate governance systems and the business systems appear to be consistent. However, if one were to take the empirical results found by Mayer and Corbett and Jenkinson at face value there would seem to be a missing link: The financing patterns of corporations would not fit the picture, and this would call into question the validity of the entire concept of a financial system as a coherent set of complementary elements.

[19] For details, see xxx (see note 14 above).
[20] The link between relationship lending, insider-oriented governance and firm-specific human capital is analyzed in greater depth by Hackethal and Tyrell (1998) and Berkovitch and Israel (1998). The correspondence between financial patterns and business systems is also discussed by Aoki (1999).
[21] See the papers by Bebchuk and Roe (2000) on the convergence of corporate governance systems. The arguments in this paper can be readily generalized to the issue of the convergence of entire financial systems.

Given that it is important to have a concept to describe financial systems, to analyze them and to make predictions about their development and their economic consequences, it is relevant that the new method of measuring financial patterns presented in this paper leads to empirical results which suggest that the financing patterns are indeed consistent with the other elements of the respective financial systems.

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Appendix 1: Sources and uses of finance of Germa n enterprises (1970-1996) as a portion of physical investment

M[1]	*Sources*	*(%)*	*Uses*	*(%)*	*Net*
	Depreciation	72.2			
	Retained Earnings	3.2			
	Capital Transfers	8.3			
	Pension Provisions	4.7			
				Internal Finance	88.4
1	Trade Credit (obtained)	32.3	Trade Credit (repaid)	-30.4	1.9
1	Trade Credit (reimbursed)	49.2	Trade Credit (granted)	-52.2	-2.9
				Net finance through trade credit	-1.0
1	Short-term bank loans (obtained)	130.0	Short-term bank loans (repaid)	-121.1	8.8
1	Short-term deposits (withdrawn)	142.8	Short-term deposits (invested)	-154.9	-12.1
6	Long-term bank loans (obtained)	72.9	Long-term bank loans (repaid)	-55.9	17.0
4	Long-term deposits (withdrawn)	5.9	Short-term deposits (invested)	-7.1	-1.2
				Net finance from bank loans and deposits	12.5
6	NBFI Loans (obtained)	9.3	NBFI Loans (repaid)	-7.6	1.7
				Net finance from NBFIs	1.7
7	Own Bonds (issued)	7.0	Own bonds (redeemed)	-5.1	1.9
7	Other Bonds[2] (sold, reimbursed)	5.4	Other Bonds (purchased)	-7.8	-2.4
				Net finance through bonds	-0.5
	Equity (issued)[3]	3.8	Equity (bought back)	n.a	3.8
	Stocks from other corps. (sold)		Stocks from other corps. (purchased)		-3.1
				Net finance through stocks	0.7
				Others (incl. rounding errors and statistical adjustments)	-0.1
			Physical investment in fixed assets	-96.9	
			Changes in working capital	-3.1	
				Gross physical investment	-100

For notes see Appendix 4.

Appendix 2: Sources and uses of finance of American enterprises (1970-1996) as a portion of physical investment

M[1]	*Sources*	*(%)*	*Uses*	*(%)*	*Net*
	Depreciation	77.6			
	Retained Earnings	11.2			
				Internal Finance[4]	88.8
1	Trade Credit (obtained)	12.3	Trade Credit (repaid)	-13.4	1.2
1	Trade Credit (reimbursed)	32.6	Trade Credit (granted)	-35.4	-2.8
				Net finance through trade credit	-1.6
1	Short-term bank loans (obtained)	48.5	Short-term bank loans (repaid)	-46.7	1.8
1	Short-term deposits (withdrawn)	29.2	Short-term deposits (invested)	-31.1	-1.8
6	Long-term bank loans (obtained)	65.4	Long-term bank loans (repaid)	-52.4	13.0
4	Long-term deposits (withdrawn)	14.6	Short-term deposits (invested)	-16.5	-1.8
				Net finance from bank loans and deposits	11.2
6	NBFI-loans (obtained)	24.6	NBFI-loans (repaid)	-19.6	5.0
4	Loans to households (reimbursed)	8.0	Loans to households (granted)	-9.5	-1.4
				Net finance from NBFIs and households	3.6
2	Own commercial paper (issued)	9.2	Own commercial paper (repaid)	-7.9	1.3
2	Other CP (sold, reimbursed)	2.4	Other CP (purchased)	-2.7	-0.2
				Net finance through commercial paper	1.1
7	Own Bonds (issued)	48.5	Own bonds (redeemed)	-35.9	12.6
7	Other Bonds[2] (sold, reimbursed)	3.1	Other bonds (purchased)	-4.2	-1.1
				Net finance through bonds	11.5
	Equity (issued)[6]	14.9	Equity (bought back)	-22.9	-8.0
	Equity of non-corp. Bus. (issued)	>10	Equity of non-corp. bus. (bought back)	<-10	0.8
				Net finance through equity	-7.2
				Net finance through foreign direct investment	-2.5
				Others (incl. rounding errors and statistical adjustments)	-4.9
			Physical investment in fixed assets	-95.5	
			Changes in working capital	-4.5	
				Gross physical investment	-100

For notes see Appendix 4.

Appendix 3: Sources and uses of finance of Japanese enterprises (1970-1996) as a portion of physical investment

M[1]	*Sources*	*(%)*	*Uses*	*(%)*	*Net*
	Depreciation	49.5			
	Retained Earnings	20.5			
				Internal finance	70.0
1	Trade Credit (obtained)	21.1	Trade Credit (repaid)	-20.3	0.8
1	Trade Credit (reimbursed)	27.1	Trade Credit (granted)	-28.0	-0.9
				Net finance through Trade Credit	-0.1
	Short-term loans[7] (obtained)		Short-term loans (repaid))		
1	…from private banks	266.0	…to private banks	-250.9	15.0
1	…from public financial institutions	37.2	…to public financial institutions	-34.4	2.8
1	Short-term deposits (withdrawn)	105.1	Short-term deposits (invested)	-112.7	-7.6
	Long-term Loans (obtained)		Long-term Loans (repaid)		
7	…from private banks	132.1	…to private banks	-99.0	33.1
7	…from public financial institutions	20.2	…to public financial institutions	-13.6	6.6
4	Long-term deposits (withdrawn)	74.3	Long-term deposits (invested)	-86.7	-12.4
				Net finance from bank loans and deposits	37.5
2	Own commercial paper (issued)	5.7	Own commercial paper (repaid)	-4.8	0.9
2	Other CP (sold, reimbursed)	1.4	Other CP (purchased)	-1.6	-0.2
				Net finance through Commercial Paper	0.7
7	Own Bonds (issued)	14.3	Own bonds (redeemed)	-9.6	4.7
7	Other Bonds[2] (sold, reimbursed)	4.7	Other Bonds (purchased)	-6.2	-1.5
				Net finance through bonds	3.2
	Equity (issued)[6]	3.8	Equity (bought back)	n.a.	3.8
	Stocks from other corps. (sold)		Stocks from other corps. (purchased)		-0.2
				Net finance through equity	3.6
				Net finance from trusts	-6.9
				Net finance from Rest of World	-8.2
				Others (incl. rounding errors and statistical adjustments)	0.2
			Physical investment in fixed assets	-84.8	
			Changes in working capital	-15.2	
				Gross physical investment	-100

For notes see Appendix 4.

Appendix 4: Notes to Appendices 1 to 3

(1) Estimated average term to maturity of respective instrument.

(2) This entry also includes bills and commercial paper, whose average portion, however, does not exceed 10%.

(3) Of course, flows for new equity cannot be estimated using the same methodology as for fixed income instruments as there are no contracted redemption repayments. We thus had to assume that the flow figures from the National accounts are equal to the total volume of new issues. This simplifying assumption seems warranted for Germany, as buybacks of own equity hardly ever occur. In another publication, the Bundesbank reports the actual volume of newly issued equity for all domestic corporations, that is including financial companies. Based on these data, new equity would account for 5.0% of the gross total of all sources. This figure represents the upper bound for the new equity entry in appendix 1.
Equity issues of non-corporate enterprises are included in internal funds. However, according to the Bundesbank (monthly report Oct. 1998, p. 36) this source of finance only amounts to 1.5% of physical investment in 1997.

(4) The discrepancy between this figure and the corresponding figure (96.1%) in Corbett and Jenkinson (1997) is primarily due to the inclusion of the farm sector.

(5) Short-term loans are not explicitly reported in the U.S. data. The 1983 (20%) and 1993 (17%) figures for their share of total loans were taken from Borio (1995). We assume here that prior to 1983 and after 1993 the portion remained constant at 20% and 17% respectively. For the intervening ten years we used linear extrapolation.

(6) It is much more common for U.S. corporations to buy back their own shares than it is for their German and Japanese counterparts. Only since 1995 has it been it legally possible for Japanese corporations to do so. Whereas net flows of funds are only slightly smaller than gross flows in these two countries and could thus be used as lower bounds on our estimates, we had to take data from stock exchange publications to approximate gross flows for the U.S. corporations. For this purpose we had to adjust the data to allow for equity issued by financial institutions.

(7) Short-term loans are not explicitly reported in the Japanese data. The 1983 (41%) and 1993 (32%) figures for their share of total loans were taken from Borio (1995). We assume that prior to 1983 and after 1993 the portion remained constant at 41% and 32% respectively. For the intervening ten years we used linear extrapolation.